

(b) depositing a silicon oxide insulating film over said silicon nitride insulating film;
and

(c) subjecting said semiconductor substrate to a plasma etching treatment using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film,

wherein a residence time of the etching gas within an etching chamber is set at 50 to 700 ms, and

wherein a temperature of said semiconductor substrate being plasma etched ranges from 60 to 140°C.

8. (Amended) A method according to Claim 1, wherein the temperature of said semiconductor substrate being plasma etched ranges from 100 to 130°C.

13. (Amended) A method according to Claim 11, wherein a flow rate of said argon gas ranges from 400 to 800 cm³/minute.

18. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon nitride insulating film over a semiconductor substrate;
(b) depositing a silicon oxide insulating film over said silicon nitride insulating film;
and

(c) subjecting said semiconductor substrate to a plasma etching treatment using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said

silicon oxide insulating film,

wherein a residence time of the etching gas within an etching chamber is set at 50 to 350 ms, and

wherein a temperature of said semiconductor substrate being plasma etched ranges from 60 to 140°C.

19. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon nitride insulating film over a semiconductor substrate;

(b) depositing a silicon oxide insulating film over said silicon nitride insulating film;

and

(c) subjecting said semiconductor substrate to a plasma etching treatment using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film,

wherein a residence time of said etching gas within an etching chamber is set at 100 to 200 ms, and

wherein a temperature of said semiconductor substrate being plasma etched ranges from 60 to 140°C.

20. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon nitride insulating film over a semiconductor substrate;

(b) depositing a silicon oxide insulating film over said silicon nitride insulating film;

and

(c) subjecting said silicon oxide insulating film to a plasma etching treatment using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film,

wherein a pressure within an etching chamber during the plasma etching treatment ranges 0.7 to 7 Pa, and a total flow rate of the etching gas passed into said etching chamber is 700 cm³/minute, and

wherein a temperature of said semiconductor substrate being plasma etched ranges from 60 to 140°C.

21. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon nitride insulating film over a semiconductor substrate;

(b) depositing a silicon oxide insulating film over said silicon nitride insulating film;

and

(c) subjecting said silicon oxide insulating film to a plasma etching treatment using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film,

wherein a pressure within said etching chamber during the plasma etching ranges from 1.3 to 4 Pa, and a total flow rate of said etching gas passed into the etching chamber is at 700 cm³/minute or over, and

wherein a temperature of said semiconductor substrate being plasma etched ranges from 60 to 140°C.

22. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon oxide insulating film over a patterned silicon nitride film with a silicon plug over a semiconductor substrate;

(b) forming a hard mask over said silicon oxide insulating film; and

AS (c) subjecting said semiconductor substrate to a plasma etching treatment through the hard mask as an etching mask using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film, so as to form a hole in said silicon oxide insulating film down to the patterned silicon nitride film in such a manner that an upper surface of the silicon plug is exposed,

wherein a residence time of the etching gas within an etching chamber is set at 50 to 700 ms.

37. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon oxide insulating film over a patterned silicon nitride film with a silicon plug over a semiconductor substrate;

AS (b) forming a hard mask over said silicon oxide film; and

(c) subjecting the semiconductor substrate to a plasma etching treatment through the hard mask as an etching mask using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film, so as to form a hole in said silicon oxide insulating film down to the patterned silicon nitride film in such a manner that an upper surface of the silicon plug is exposed,

wherein a residence time of the etching gas within an etching chamber is set at 50 to 350 ms.

38. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon oxide insulating film over a patterned silicon nitride film with a silicon plug over a semiconductor substrate;

(b) forming a hard mask over said silicon oxide film; and

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(c) subjecting the semiconductor substrate to a plasma etching treatment through the hard mask as an etching mask using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film, so as to form a hole in said silicon oxide insulating film down to the patterned silicon nitride film in such a manner that an upper surface of the silicon plug is exposed,

wherein a residence time of the etching gas within an etching chamber is set at 100 to 200 ms.

39. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon oxide insulating film over a patterned silicon nitride film with a silicon plug over a semiconductor substrate;

(b) forming a hard mask over said silicon oxide film; and

(c) subjecting the semiconductor substrate to a plasma etching treatment through the hard mask as an etching mask using an etching gas containing a fluorocarbon gas,

oxygen and a dilution gas to process said silicon oxide insulating film, so as to form a hole in said silicon oxide insulating film down to the patterned silicon nitride film in such a manner that an upper surface of the silicon plug is exposed,

wherein a pressure within the etching chamber during the plasma etching ranges from 0.7 to 7 Pa and a total flow rate of the etching gas passed into the etching chamber is 700 cm³/minute or over.

40. (Amended) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

(a) depositing a silicon oxide insulating film over a patterned silicon nitride film with a silicon plug over a semiconductor substrate;

(b) forming a hard mask over said silicon oxide film; and

(c) subjecting the semiconductor substrate to a plasma etching treatment through the hard mask as an etching mask using an etching gas containing a fluorocarbon gas, oxygen and a dilution gas to process said silicon oxide insulating film, so as to form a hole in said silicon oxide insulating film down to the patterned silicon nitride film in such a manner that an upper surface of the silicon plug is exposed,

wherein a pressure within the etching chamber during the plasma etching ranges from 1.3 to 4 Pa and a total flow rate of the etching gas passed into the etching chamber is 700 cm³/minute or over.